

## DELTA AIR LINES LOFT TRAINING

Captain Jay Whitehead

It is a pleasure for me to be able to participate in this LOFT workshop with you. I would like to share with you today some of Delta's experience with LOFT. I want to point out where we have experienced some difficulty and where we have concerns regarding the effectiveness of LOFT as a complete training vehicle.

Delta instituted its LOFT training in August of 1978, shortly after Advisory Circular 120-35 was issued. The LOFT program was developed as part of the DC-9 training program which has served as a prototype for much of Delta's other aircraft training programs. We had been using many of the LOFT principles in our initial DC-9 training program prior to adopting formal LOFT scenarios. Each training period began as a normal flight from departure to destination. The scenario was loosely scripted with abnormals and emergencies programmed as required for each stage of training. Flight plans, weather, weight data, and related flight papers were issued to the crew during the briefing prior to their training session. Once the simulator arrived at the destination, we would generally abandon the line operating atmosphere and practice Appendix E maneuvers for the balance of the training session.

The LOFT scenarios were developed under the Advisory Circular as an expansion of the initial training profiles which we had been using previously. The nature of Delta's DC-9 line operation affords us many flight sequences which are readily adaptable to simulation using LOFT principles. Delta's hub-and-spoke system utilizes the DC-9 to operate to close-in airports and back to the hub with passengers to feed the longer route structures. We have been able to duplicate these short-leg segments in our LOFT scenarios.

Our concept of LOFT differs little from the ideology presented in the Advisory Circular. We are very conscious of the fact that the Appendix F type of checking and training exercise is artificial in its application. Pilots have been able to adjust their routines to be efficient in this situation which is not much more than a rapid series of disassociated maneuvers. In the real-life environment, the clock cannot be stopped so that a problem can be examined in detail; nor do problems mysteriously disappear when their training value is no longer significant. It is not like a hurdle race where you surmount the obstacle immediately confronting you, and once by it, consider it no longer.

LOFT has given us the ability to present the real-life environment where crews must deal with the problems presented and live with the results for the duration of the flight. Sometimes the problem resolution is complete, but usually the situation presents lingering effects which reflect cumulatively on the total operation. LOFT offers line-crews an opportunity to exercise their problem solving skills as well as demonstrate their everyday flying capability. Crews are able to develop insights into the crew coordination and resource management requirements of situations which tax their capabilities to the utmost. The normal line operation does not usually offer pressures which demand maximum effort by all crewmembers in concert to resolve a problem. However, when this time does arise, the crew should have previously practiced their coordination and management skills. The LOFT program affords an opportunity to use these management tools in situations which are critical and often stressful.

LOFT has a side benefit as well. It has provided a unique opportunity to observe the application of our procedures in the line environment. Our instructors can observe the appropriateness of our procedures in normal, abnormal, and emergency situations. These procedures may be seen to their normal conclusion. Prior to LOFT, procedures were often expedited or sometimes halted prematurely when a problem ceased to have training value. We were forced to race the clock in order to complete all the required maneuvers. We have also discovered areas where our own training program can be improved as a result of observations of crew performance during LOFT periods.

One of the most important ingredients determining the success of LOFT is the presentation of the concept to the crew being trained. Most crews are uncomfortable with the training/checking situation to begin with. The crew must be made aware of the objectives of LOFT. They need to become comfortable with the new concept and not feel this is just another bag of training tricks with a new label. The crew needs to know that we will be simulating the normal line environment as closely as possible. They must know that we expect them to operate exactly as they would on a line trip. Each crewmember should feel that he is not being manipulated by the training environment, but performing crew duties as he would every day.

We have found that the crews have a difficult time understanding that the instructor will not take an active role instructing during LOFT. During their first LOFT exposure, it often takes one or two legs for the crew to understand this notion. At this point they will stop looking to the instructor for guidance and begin conducting the flight as if it were real. This realization by the crew is necessary for the accomplishment

of LOFT and the earlier it occurs in the period, the better the training value. Ideally, this understanding should be reached in the briefing phase prior to getting into the simulator.

We emphasize during the briefing that there are no specific performance criteria that we are using to judge the crew's performance during the LOFT period. We stress that LOFT must be completed satisfactorily, but downplay the pass-fail concept. We encourage each crewmember to exercise his judgment to cope with a situation or developing problem. We recommend performance which falls within the scope of our pilot operating procedures. However, if another method may resolve the problem more adequately, judgment may indicate the use of an alternate course of action. Regardless of the procedure used, the crew must live with the result until the conclusion of that flight.

Each crewmember must feel that he is controlling his situation and is free to use his judgement as warranted. The objective must be to manage the conduct of the flight using all the resources available while coordinating his activities with other crewmembers. The crew must not feel that they are second guessing the instructor for the "approved solution" in the conduct of the flight.

We have just completed and received approval for six scenarios for our B-727 LOFT program. The construction criteria used were similar to the DC-9. Our DC-8 and L-1011 scenarios are in the development stages now.

If we were to rank our criteria for scenario construction, the first consideration would have to be leg-length. We want the LOFT scenarios to be representative of the typical operation of the aircraft. Basically, the DC-9 and B-727 fly shorter leg distances with more legs flown in each trip sequence. We have chosen to fly four legs in each of the LOFT scenarios for the DC-9 and the B-727. The Captain and First Officer each fly two legs to maximize the training. The arrival and departure stations have been chosen so that the timing of each scenario falls within the 3:20 and 4 hour time period specified by the Advisory Circular. Since we qualify our First Officers to Category I minimums, we utilize the balance of the period flying the certification approaches.

Once we determine the probable city-pairs based on leg-length, we next look into the navigation facilities which are available to us. We are limited in developing scenarios by the storage capability of our simulator computers. Our computers for the older simulators have a storage capacity of approximately 500 navigation facilities. Our newest B-727 AST simulator has storage for 1000 facilities. We must be very careful in selecting departure and destination stations. All

the navigation facilities we need to use enroute must be available to us in the computer storage system. In addition, navigation aids must be available at both the destination and departure airports. Quite often, after we research the enroute facilities for adequacy, we find we are limited in the types of approaches that we can program at the destination airport.

We have 18 airport models prepared for our CGI display system. These are complete in detail with respect to approach light systems, runway configuration, as well as taxiway configurations. Even prominent landmarks in the vicinity of the airport are displayed in the event we program the weather and visibility to be able to see them. Unfortunately, most of these models are located at points so far distant from each other that we are unable to fly between them within the time prescribed for LOFT. In order to program the CGI for the cities we want to use for LOFT, we must sacrifice some of the realism. We have to take one of the models which is similar in configuration to the airport we want to use and insert it into the CGI system. We then activate the runway needed and associated lighting for that runway. We lose some of the realism due to the fact that runway turnoffs, taxiways, terminal buildings and ramps are associated with the model airport and not the airport we are operating to. Taxi instructions are given by the tower to the crews to position the aircraft. It can be a problem for a crew if they anticipate a right turn-off and the taxiway turn-offs are only to the left. They wonder if they have landed at the correct airport. We will be developing a model airport which we call Anytown, USA, to fit this situation. This model should allow us to display the runway system with the capability of selecting parallel taxiways on either side of the runway, whichever is appropriate for the airport we are operating to.

We strive for realism in our scenarios and formulate them to present an operating environment as closely aligned to the line operation as possible. We attempt to maintain a workload which is manageable but one which offers little opportunity for relaxation. You can imagine there is very little idle time when accomplishing four legs during a three hour and twenty minute period of time.

Communications are developed normally and at times can cause difficulties for a crew especially on a leg as short as some that we have developed. For the two man crew, communications becomes a more significant factor in their workload. We do present situations where the crew loses contact with ATC. They must return to the previous frequency to reestablish contact, or refer to charts to gain radio contact. Some of the abnormal conditions which we present result in the loss of radio contact for periods of time. All of the crew's contacts outside the aircraft are made using the radios and

interphone systems in the case of Maintenance or Aircraft Service personnel.

Cabin crew and flight crew interaction is minimized in our scenarios. Contacts are made so that the flight crew becomes aware of the fact that they must consider the cabin condition even though they are operating a simulator. Contacts result usually from unusual situations in the cabin; for example, cabin smoke, passenger or flight attendant illness, turbulence, etc.

Particular care should be taken in selecting abnormal and emergency situations. It is very easy to sit down and dream up a scenario using one of these abnormals and one of those emergencies along with an irregular ATC clearance. Before you know it, you have placed the crew in a situation which becomes totally unmanageable, and the value of LOFT has been destroyed. The scenario will appear very simple when described on paper; however, the performance in the simulator becomes very complex, very quickly. We test flew each scenario several times prior to finalization to verify that the manageability of the workload and pacing of events was adequate. When we were satisfied with a scenario, we invited the FAA to fly it and obtained their approval. We did this for each of the scenarios which have been approved for our LOFT programs.

In a few instances, we have placed one of the crewmembers in a situation where he is not able to keep up with the demands of the situation. This is intentional, but is not intended to cause the total overload of an individual. We do this to demonstrate to the crew that this can occur very quickly and allowances must be made to account for this by an extra turn in a holding pattern, extending the downwind leg, or delaying a takeoff. A good crew manager will recognize this immediately, but a poor manager needs to be shown how the operation can be downgraded if allowances are not made for the completion of the work.

We have been responsive to the inputs made by line-pilots in the development of our LOFT programs. Many of the situations we offer in our LOFT scenarios have been adaptations of similar real-life events. We continually evaluate the daily maintenance reports to determine trends or unusual discrepancies which might be incorporated in our scenarios.

We also monitor industry safety reports and incident reports. Significant safety related situations have been included in our scenarios where we have felt the exposure would be beneficial to our pilots.

We present problems to the crews in LOFT which are plausible and not unrealistic. The success of the LOFT concept

depends to a great extent on its acceptability by the crewmembers experiencing this training. If we were to load up the scenarios with events which were unlikely to occur in real-life, the program would eventually lose its credibility and become useless as a training vehicle. Each scenario must be valued by the line-pilot as an opportunity to broaden and enhance his professional capabilities.

Since the inception of our LOFT training in August, 1978, we have conducted 150 LOFT periods in our DC-9 program. We would have liked to have scheduled more, but our scheduling demands were such that we could not pair crewmembers together more often. Captains must be receiving training in lieu of a check and First Officers may be scheduled for either a check or training in lieu. Of the 150 First Officers receiving LOFT, most were receiving training in lieu of a check. Only 19 First Officers who received LOFT were fulfilling the proficiency check requirements. This is primarily due to the fact that First Officers usually transition to other aircraft prior to their accumulating 24 months experience on the DC-9.

As we initiate our LOFT program on the B-727, we can see that adding an additional crewmember will complicate the scheduling process. We have not been able to fully assess the impact yet. We do feel that if we were able to have the flexibility of making substitutions with training personnel, we would be able to conduct LOFT more frequently. This would also enable us to salvage a LOFT mission in the event of a last minute cancellation by one of the required crewmembers.

Our briefings for the LOFT period begin with a discussion of the LOFT concept and the objectives of the training. This is a very important step. The stage must be set properly in order for the crew to derive the most benefit from the training. As I indicated earlier, once the crew understands the concept and the methods which will be used in conducting the training, they will be able to immerse themselves in the rigors of flying the simulator. Until they understand the situation, they will not totally involve themselves in the training. They will revert back to previous experiences where they were given sets of isolated problems. After years of Appendix F training, the crews have grown dependent on this type of presentation.

We stress the real-world atmosphere during the briefings. We emphasize that the crew should operate just as they would on an actual line trip. Any problems which arise should be resolved using standard procedures. The crew must live with the result of a malfunction throughout the flight until maintenance can provide a fix after landing.

At this point, we add a disclaimer to the real-life presentation. We explain to the crew that we are not able to duplicate all the airports in their entirety with the CGI system. We explain that the runway and lighting systems should be accurate; however, the taxiways and ramps are not always positioned accurately. We suggest asking for progressive taxi instructions where necessary for ground maneuvering.

We present the crew with the flight papers which we have duplicated from the actual line operation. We brief them on the sequence of legs they will fly and give them a timetable to go by so they may pace themselves and plan their time as they would on the line for specific departure times. We provide a summary of the overall weather conditions in which they will operate along their series of legs. This is in addition to the specific airport observations.

We provide ample time for the crew to analyze the information we have provided. Realizing a conscientious crewmember would have completed a substantial amount of preflight organization and planning prior to a line flight, we must allow an opportunity to do this in LOFT rather than throw the crew into the situation cold.

Usually the simulator programming is prepared for the first leg prior to the crew's entry. This is accomplished by the instructors while the crew is reviewing the flight papers and accomplishing its preflight planning. A preflight inspection of the aircraft is performed through a slide presentation. This preflight is monitored by the check airman/instructor for the DC-9 First Officer or the check engineer for the B-727 Second Officer.

While in the simulator the instructors serve as coordinators, communicators, controllers, mechanics, and generally perform any role in response to requests by the flight crew. The only role they do not actively play is instructor. The instructor may not make any suggestions or give any assistance to the crew about the operation of the flight. Of course, the instructor is continually performing as an evaluator of the crew's performance.

Each scenario has a script for the instructor to follow during the LOFT period. There are no deviations or alterations allowed in the execution of the training. This is ensured by strictly following the script. The pilot instructor provides communications from ATC, the dispatcher, and meteorology; while the Flight Engineer Instructor provides communications from mechanics, ramp service, and cabin attendants. In the case of

the DC-9, the pilot instructor provides all communications with the crew.

The script should be adequate to prevent deviations from the scenario. We usually provide instructions in the script to describe a course of action in the event the crew has a multiple choice of actions. The most logical course of action is planned and we provide instructions for contingencies. If a situation arises causing a deviation which we had not considered, we must rely on the instructor's ingenuity to put the flight back on the right track. We have found that our flight control dispatchers can be especially helpful in prodding the crew back to the planned scenario. The instructor can get the crew's attention by using the SELCAL and then communicating as the dispatcher when the crew responds. In addition, temporary weather adjustment enroute and in terminal areas often are sufficient to cause the crew to return to the scenario.

When the LOFT scenario has been completed, we utilize the remaining time to recertify the First Officer for Category I minimums. While this recertification is in progress, the check engineer will split the engineer's panel off from the rest of the simulator so that it will not affect the performance of the simulator for the pilots. Then the check engineer may conduct additional system reviews in areas not specifically covered by the LOFT scenario. Remedial training may be given if this is necessary.

LOFT is new to our flight engineers. They have expressed some reservations about the adequacy of LOFT to provide the necessary in depth system review which flight engineers had been getting during requalification checks. Their concern is mostly associated with the long-term effect. Will flight engineer system knowledge and operational proficiency decline if LOFT is given consecutively for two or three years? Should we have a mix of LOFT and requalification checks?

The LOFT debriefing offers an opportunity to provide the real instruction of the program. The instructor is now free to make his comments on the conduct of the flight after possibly biting his tongue for the previous four hours. The instructor is aware of the objectives to be accomplished for each scenario including the subtleties involved with carrying out the objectives. The scripts we use amplify this information for the instructor. The instructor must advise the crew of these objectives and then review their performance in fulfilling the objectives.

The debriefing for LOFT is usually longer than the briefing phase. It is animated quite a bit more than the debriefings of proficiency checks. I feel this is due to the fact that the



individuals feel more involved in the training with LOFT. They will participate in the debriefing more actively. Most times they can debrief their own performances very well. The lessons they have learned will be remembered for a long period of time. Unlike the proficiency check, the crews cannot come back with the thought that it wouldn't have happened on the line. Since they are allowed to use their own devices and resources to accomplish the objectives, they cannot easily rationalize away an error. These are the best lessons.

The instructor must be well trained in order to conduct LOFT successfully. The instructor wears many hats while participating in the program. His performance directly affects the degree of receptiveness of the crew. He must use a great amount of finesse in operating the simulator so that it will not detract from the realism. He must be intimately familiar with the line-operating environment either by flying the line periodically or making frequent line-observation flights.

We give a comprehensive training program for our new instructors. We outline various instructional techniques, observation skills, and evaluation criteria. Each month we conduct an instructors' recurrent training course which each instructor must attend annually. This recurrent program reviews the information presented to new instructors as well as presents recent topical information.

Our B-727 instructors are qualifying now to be able to conduct LOFT. Each receives a comprehensive briefing on the LOFT concept and a review of the LOFT scenarios. Prior to their conducting LOFT unassisted, each instructor is observed and coached by a supervisor while conducting LOFT with a line-crew. One or two LOFT periods may be required to check out an instructor in LOFT.

We use LOFT to supplement our other training programs. The DC-9 initial training program has a LOFT profile incorporated in it for First Officers. Most of the DC-9 initial First Officers have upgraded from flying Flight Engineer. This is usually their first experience as a pilot for the airline. We have included LOFT to increase their familiarity with line operations.

We know that our training program is somewhat segmented in its presentation. We train for proficiency in each maneuver separately with the overall objective of having the trainee totally proficient at the end of the training program. The new First Officer has not had many opportunities to put a whole flight together in real-time. Our LOFT exercise schedules four legs to be flown real-time. The emphasis of this training is to familiarize the trainee with the normal operation from takeoff

to landing. It provides the trainee an opportunity to plan his flight and pace himself in the normal environment. The instructor makes inputs as necessary to aid the trainee in completing the flights. Special emphasis is put on descent planning, descent profiles, and meeting crossing restrictions. We program instrument conditions for approaches, but present visual conditions soon enough to allow the trainee to align the aircraft with the runway visually. We usually program crosswinds to allow practice of crosswind landing techniques.

We had two motives in mind when we incorporated this LOFT program. The primary motive was to decrease the amount of real aircraft training required for proficiency. The secondary motive was to provide the airline a pilot who was more line-oriented. We were successful on both counts. We have reduced our aircraft training flights by half for our new First Officers. Line-check-airmen report that our new First Officers require less guidance and are generally more capable during their initial operating experience flights.

We have used LOFT to supplement our fuel conservation program. Each LOFT scenario includes a tabulation of fuel use for each of the legs flown. Each time a leg is flown, the instructor lists the fuel burned plus any remarks explaining excessive consumption. We observe the fuel conservation techniques of each crew and compare their fuel use with previous flights. If we need to suggest improvements to the crew in debriefing, we have a data bank to compare their performance with. The comparison can be an eye-opener for the crew which shows little regard for conservation.

As we prepare our advanced simulation training program under Advisory Circular 121-14C, LOFT again will be used as an integral part of the package. We have plans to administer this LOFT in a similar fashion to what we have done on the DC-9 for our First Officer initial training. We are planning the four-hour LOFT program with one normal leg, one leg containing abnormal and emergency flight operations, and additional legs to demonstrate the performance characteristics of the aircraft with varying configurations and operating techniques. We intend to utilize the instructor actively during this training, and one the two required legs have been completed, we plan to take advantage of some of the simulator gadgetry to make comparisons of various performance characteristics and demonstrate the effects of varying configurations.

We have discussed developing a leadership and command LOFT program. This would serve to supplement our training for new Captains. The scenario would consist of situations where a new Captain would be called upon to exercise his new leadership

functions and demonstrate his management capability in selected representative situations.

In summary, after using LOFT for approximately two years, we have become believers in the program. We are becoming more actively involved and soon we will have LOFT programs operational for all of our aircraft. LOFT is not a panacea to solve all of our training needs. It does fill the gap perfectly between the artificial Appendix F checking and the real world situation.

#### Discussion

CAPTAIN TRAUB: You mentioned the training value of overloading crews. My question is, how do you go about doing that and still maintain a realistic situation in the scenario?

CAPTAIN WHITEHEAD: Well, I think that this overloading occurs--and we do not do it intentionally--in the flight engineer's seat. That is the center of coordination activities in the airplane with the gathering of paperwork, analysis of problems, etc. Occasionally, even in the line situation, the flight engineer will become overloaded, and the captain needs to consider this in the operation of the flight and handle it accordingly. We have built this factor into our scenarios, and it is not very difficult to do. It is easy for the flight engineer to become time-pressed. We have put it there so that the crew, especially captains, realize various workload demands, both in normal and abnormal situations.

MR. WARRAS: You spoke of crew managers. Are you referring to instructors?

CAPTAIN WHITEHEAD: No, I am talking about the captain as the crew manager. We would like the captain to be able to see how task demands affect his crew. In some cases, he may need to make an extra turn, or extend the downwind leg so that the work can be accomplished. A lot of errors that have resulted in incidents are due to the fact that crew tasks were not accomplished. We want them to be able to see this and be able to deal with it when it does occur on the line.

MR. THIELKE: You said that the instructor must be well-trained in order to conduct LOFT successfully. I think all of us in the room would agree with that. You said that an instructor must be intimately familiar with the line operating environment either by flying the line or by making frequent line observation flights. Do you feel that line observation provides an instructor with an intimate knowledge of line flying?

CAPTAIN WHITEHEAD: I was referring to an instructor who may not

be medically qualified to fly the line any longer, but we can still use him in the LOFT environment. Where he was once familiar with line operation, he is no longer directly associated with it, and we encourage these people to go out and observe at regular intervals so they will have an accurate picture of the line situation.

CAPTAIN NUNN: Jay, I simply want to concur with what you said about instructors and their qualifications. In fact, just to go one step further, our instructors are actually changing their roles, becoming actors. If we are not careful, in view of the fact our union representatives are here, the Screen Actor's Guild is going to be after us. Maybe ALPA, APA, and FEIA had better watch out.

CAPTAIN WHITEHEAD: This is very true. The instructors are becoming actors. Our scenarios are written just like a movie script would be written.

CAPTAIN NORMAN: Jay, what is Delta's plan for zero-flight time.

CAPTAIN WHITEHEAD: I alluded to it briefly in my comments regarding 121-14C. We are planning to use LOFT according to the Appendix. I am not sure how Appendix H applies specifically, but as far as the Advisory Circular on LOFT, we are planning to use it as a vehicle to supplement the normal training environment, the Appendix E type training situation with repetitions and so forth. On our other aircraft--I am not thoroughly familiar with the others, I am on the DC-9--begin with a series of training maneuvers and exercises in a LOFT-type concept. It is not LOFT, but a LOFT-type concept, and then get into specific maneuvers. I see us maintaining the same type posture--giving pilots a good workout in LOFT prior to the line-check.

CAPTAIN NORMAN: I have not had a chance to review your simulator installation. What do you have? Are you using a six-axis simulator now? Do you have up-to-date models?

CAPTAIN WHITEHEAD: The DC-8 is not, and the DC-9 is not. We have one AST 727 which is a six-axis system and the L-1011 is a six-axis simulator. We will be getting another 1011 and another 727 shortly after we move to our new installation. We have a mix of both types of simulation.

CAPTAIN ATKATZ: With reference to the Actor's Guild, have you had difficulty with instructors passing their screen tests?

CAPTAIN WHITEHEAD: No, we have a very comprehensive training program for instructors, which is, of course, associated with the selection process. We start with ground school of four days

duration and then general principles involved in being an instructor. We talk about concepts and theory, and then we work on the specifics of the training situations. We then send them to the simulator to view the application of the concepts that we have talked about for the last three or four days. This is all before they get involved with their particular airplane--this is just the role of being an instructor. Once they have completed this phase, they go through their aircraft training as an instructor, learning the aircraft, the simulator operation, what they need to instruct, the profiles and syllabus requirements. Associated with that is a briefing on LOFT. Of course, before they actually do each portion, whether it be a check-ride, or training in lieu, or initial training, or LOFT; they are observed and get on-the-job training. They are approved by supervisory personnel before they are turned loose.

CAPTAIN KARABELLA: Are all of your instructors line-pilots?

CAPTAIN WHITEHEAD: There are a few who are not--they are mostly line-pilots. In a couple of instances, we have people who administer training who have not been line-pilots. We do utilize personnel who have been line-qualified, but are no longer medically qualified, but as a general rule, most of our instructors are line-qualified. We usually rotate two, three, or four times a year in order to maintain our line-qualifications.

CAPTAIN KARABELLA: You said you rotate to maintain the qualifications. Are any of these people dual-qualified?

CAPTAIN WHITEHEAD: Yes, but they do not serve in that dual-qualification function as instructors, however.